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Ser 1832/L6159
28 Mar 1996

Mr. Cyrus Shabahari
Department of Toxic Substances Control
Region 2
700 Heinz Avenue, Suite 200
Berkeley, CA 94710-2737

Subj: HUNTERS POINT SHIPYARD AMBIENT LEVEL CALCULATIONS

Dear Mr. Shabahari:

As you know, one of the items discussed at the Hunters Point project team meeting of December 19, 1995, was the need for a written Navy response to the October 2, 1995, letter from the Department of Toxic Substances Control (Department) regarding the Hunters Point ambient levels (HPALs) and concerns about potential analytical errors in the soil data.

The purpose of this letter is to respond to the referenced letter and to clarify the concerns regarding potential analytical errors in the soil data used for the calculation of the Hunters Point Shipyard (HPS) ambient levels expressed by the Department in its letter of October 2, 1995, and in the memorandum dated January 19, 1994.

Hunters Point Shipyard Soil Ambient Levels

As stated in its October 2, 1995, letter, the Department accepted the Hunters Point Ambient Levels (HPAL) calculated using the method originally used by the Navy for preparation of the HPAL document dated May 15, 1995. However, the Department also proposes the adoption of regression-based equations provided to the Department by the Navy on September 26, 1995, for the calculation of HPALs for chromium (Cr), cobalt (Co), and nickel (Ni). These regression-based equations were based on the method outlined by the Department in its October 17, 1994, technical memorandum.

The enclosed Table 1 lists the HPALs for all metals and all soil types as proposed by the Navy and accepted by the Department.

Analytical Errors in the Soil HPAL Calculations

In the October 2, 1995, letter from the Department, it was stated as follows:

"...the acceptance is done with the understanding that additional data have not been reviewed by the Department and that the Department believes a portion of the antimony (Sb) data is erroneous because of laboratory error, as explained in previous communication by the Department..."

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The previous communication referred to is a Department memorandum dated January 19, 1994. The Department's concerns were explained in detail in that memorandum, the pertinent sections of which are reproduced here.

The first item in the General Comments section of the Department's memorandum dated January 19, 1994, states the following:

1. **HLA has assumed that all laboratory analyses are valid. In a systematic analysis of the data on a site by site basis, problems related to systematic errors and multiple detection limits were evaluated:**
 - (a) **Evidence of systematic error: Concentrations of antimony and cadmium appear to be much higher than would be expected for the types of soil materials sampled at Hunters Point. For example, values were also found to be unusually high in sites IR-4, 6 and 8 and Ag in site IR-4. That these high values are due to laboratory error rather than to contamination is suggested by the uniformly high concentrations at all depths and the lack of evidence of the disposal of wastes containing these elements. Since concentrations of Sb and Cd in Site IR-10 soils appeared to be more within the range of known background concentrations in U.S. soils, IR-10 soils were used to estimate background Sb and Cd concentrations.**
 - (b) **Detection limit problems: Concentrations of elements such as mercury, molybdenum, selenium, silver, and thallium are often reported below detection limits (DLs). Also, there may be multiple DLs. Evidence of multiple DLs is seen in multimodal histograms (Figure 3) and stepped probability plots (Figure 4). As such, the nature of the distribution of these element concentrations can not be well characterized. However, some laboratories appeared to have much more sensitive analytical procedures which resulted in a much greater proportion of the data being above DLs. Sites IR-4, -5, and -10 appeared to have a greater proportion of values above the DL.**

With respect to the assumption that all laboratory analyses were valid, it needs to be stressed that all of the Hunters Point data gathered undergoes a data validation process. The data set that the Department reviewed was validated using the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (EPA, 1988) which reviews performance requirements that are fully under a laboratory's control. The validation process assigns a variety of qualifiers based on specific areas, with all samples being assigned a qualifier. The specific areas include holding times, blanks, calibration standards, calibration verification standards, laboratory control standards, and interference check standards. Data that is rejected (R) due to exceedances of the performance requirements as outlined in the Functional Guidelines is considered unusable for any purpose. The data set that the Department received contained qualifiers for all metal data points.

With regards to the suspected systematic problems for antimony and cadmium, the methodology used for the analysis of metals, inductively coupled plasma (ICP), is subject to spectral interferants which may

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potentially cause falsely elevated or falsely negative results when sufficiently high concentrations of certain analytes, specifically aluminum, calcium, iron, and magnesium are found. This is especially true for soil samples which contain high concentrations of all four of these elements, therefore, creating a complex matrix. Because of these spectral interferants in the ICP analysis, the establishment and use of interelement correction factors (IEC) are used for assuring quality data.

IECs are established by analyzing solutions of known concentrations of single element standards (aluminum, calcium, iron, and magnesium) at every wavelength used. Any significant positive or negative bias of analytes not present in the solution are considered to be caused by an interferant. The instrument software is then configured to compensate for these results, and compensation is assumed to be linear, thereby reducing possible errors.

With regards to the suspected detection limit problems, for the analysis of metals, all laboratories need to be able to detect concentrations at the contract required detection limit (CRDL), but report non-detected concentrations down to the instrument detection limit (IDL). The IDL is a statistically derived concentration, is laboratory-specific, instrument-specific, and is re-calculated every six months. In general, the IDL is ten to twenty times lower than the CRDL, but it is extremely metal-specific. So the detection limit variation that the Department noticed is a valid remark, however, this is an EPA-specified reporting requirement stated in both the Contract Laboratory Program (CLP) and in Test Methods for Evaluating Solid Wastes (SW-846).

The Navy wants to assure the Department that all precautions are undertaken in order to generate sound and reliable data, but that analytical analysis are subject to methodology constraints. Data that is severely flawed is rejected during the data validation process and are not used for any purposes. If you have any questions regarding this letter, please call me at (415) 244-2655.

Sincerely,

Original signed by:

RICHARD E. POWELL
Lead Remedial Program Manager for HPS/TI
By direction of
the Commanding Officer

Enclosure: TABLE 1

Copies to:

U.S. Environmental Protection Agency (Attn: Ms. Sheryl Lauth)
U.S. Environmental Protection Agency (Attn: Anna-Marie Cook)
Roy F. Weston, Inc. (Attn: Ms. Karla Brasaemle)
California Regional Water Quality Control Board (Attn: Mr. Richard Hiatt)
PRC Environmental Management, Inc. (Attn: Mr. Jim Sickles)
Harding Lawson Associates (Attn: Mr. David Leland)

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Blind copies to:

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Adm. Records (3 copies)

Chron, Pink, Green

Activity File: HUNTERS POINT SHIPYARD (AKA HPA) (File: L6159RP.DOC) ab

TABLE 1

All Soil Types		
Metal	Total No. Of Samples	95% UCL of the 95 percentile (Ambient level)
Antimony	2,532	9.05
Arsenic	2,848	11.10
Barium	2,870	314.36
Beryllium	2,870	0.71
Cadmium	2,869	3.14
Copper	2,870	124.31
Lead	2,869	8.99
Manganese	2,799	1,431.18
Mercury	2,830	2.28
Molybdenum	2,870	2.68
Selenium	2,728	1.95
Silver	2,832	1.43
Thallium	2,833	0.81
Vanadium	2,869	117.17
Zinc	2,870	109.86

The regression-based equations for Cr, Co, and Ni are as follows:

$$HPAL_{Cr} = \exp[(0.6894 * Y_{Mg} - 1.9999) + (1.645 * 0.5557) \sqrt{1 + \frac{1}{3057} + \frac{(Y_{Mg} - 10.478)^2}{(3056)(1.2821)^2}}]$$

$$HPAL_{Co} = \exp[(0.5182 * Y_{Mg} - 1.9425) + (1.645 * 0.3744) \sqrt{1 + \frac{1}{3061} + \frac{(Y_{Mg} - 10.475)^2}{(3060)(1.2875)^2}}]$$

$$HPAL_{Ni} = \exp[(0.9486 * Y_{Mg} - 4.2997) + (1.645 * 0.6198) \sqrt{1 + \frac{1}{3059} + \frac{(Y_{Mg} - 10.479)^2}{(3058)(1.2824)^2}}]$$